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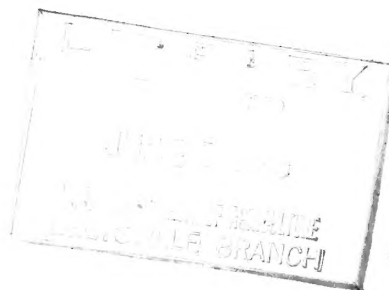
**CROPS
RESEARCH**

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HERBACEOUS PERENNIALS

For The

CENTRAL GREAT PLAINS



Agricultural Research Service
UNITED STATES DEPARTMENT OF AGRICULTURE

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Herbaceous Perennials for the Central Great Plains

By Gene S. Howard¹

Introduction

The central Great Plains of the United States is an area distinctive in its plant growth and native plant species. It was the native home of the great herds of buffalo and has been known since the advent of the white man as the short grass country. Native vegetation, except along natural waterways, is confined largely to nonwoody species; a few notable exceptions are sagebrush, greasewood, cactus, and yucca. The region is characterized by low annual rainfall, high wind movement, and low relative humidity. The central Great Plains region and its annual rainfall lines are shown in figure 1.

Because of the harshness of the climate most native plant species behave as herbaceous perennials, in which the plant survives the winter as various types of underground roots and rootstocks. The main feature of the winter that limits survival of plants is not the cold temperature alone, but the combination of cold, wind, and low humidity often associated with low soil moisture. Unless plants have developed special defenses to meet these climatic conditions--such as small numbers of thinly scattered lenticels and leaves, sunken or protected stomata, or the ability to survive as underground root parts--they become desiccated and suffer from killback, especially during the winter. Because of their ability to survive the winters of the Central Great Plains, the group of nonwoody plants widely known as herbaceous perennials have a definite place in ornamental plantings within the region. They are especially important since the number of woody ornamentals adaptable to the area is limited.

This report summarizes herbaceous perennial trials at the Cheyenne Horticultural Field Station, which is representative of some of the most difficult growing conditions to be found in the Central Great Plains region. Successful perennials at Cheyenne should be adapted to most of the Central Great Plains region and are worthy of trial in the entire Great Plains region.

Review of Literature

Preston (5)² of the Canadian Department of Agriculture station in Ottawa, Ontario, wrote at length on flower-bed design and culture of herbaceous perennial species and classified them

¹ Cheyenne Horticultural Field Station, Cheyenne, Wyo., a station of Crops Research Division, Agricultural Research Service.

² Underscored numbers in parentheses refer to Literature Cited at end of publication.

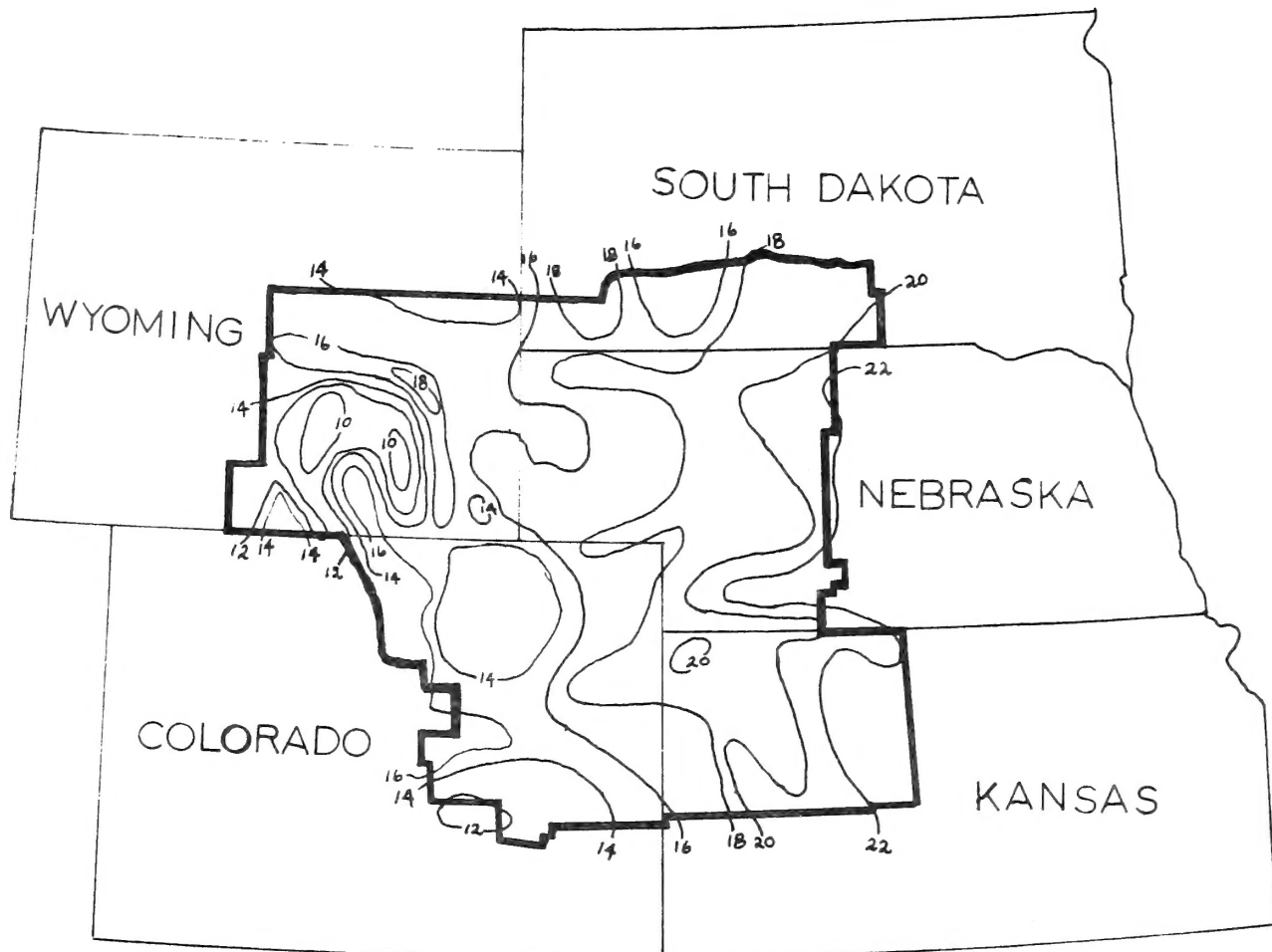


Figure 1.--The central Great Plains region, outlined by the heavy line, showing the average rainfall in inches. This map is adapted from the USDA 1941 Yearbook of Agriculture (6).

according to their adaptability to 23 specific regions covering each of the Canadian Provinces. She made recommendations for specific locations in the garden and described more than 500 herbaceous perennial species and cultivars.

Hansen (1), working at the South Dakota Agricultural Experiment Station in Brookings, noted that several hundred varieties of perennials had been tested at that station. He briefly described a few of the most adaptable kinds.

Herman (2), working at the Washington Agricultural Experiment Station in Pullman, listed six requirements of a herbaceous perennial planting and classified approximately 150 adaptable kinds according to flower color, height, and tolerance to sun exposure.

Oliver (3), of the Dominion Experimental Farm in Ottawa, Ontario, Canada, made descriptive notes on 129 genera and their major species and cultivars adaptable to Canadian gardens.

Oliver (4), in another publication, discussed cultural methods, propagation, and other problems in growing herbaceous perennials. He made species recommendations for special locations in the garden and for specific regions in the Canadian provinces.

The Perennial Garden

Many gardeners have expressed a preference for a flower garden consisting entirely of perennials rather than of annuals or of mixed types. Their basic idea is that perennials do not have to be reset each year and that they survive and grow beautifully with a minimum of care and attention. However, perennials often require more care than annuals. They must be topped and their old stems removed; most perennials need to be dug and divided periodically, at intervals of from 2 to 5 years. Those that reseed themselves must be kept under control and those with vigorous rhizomes must be regularly pruned and cut back to keep them in the desired area. Roots of perennials often become intertwined with grasses, other ground covers, and competing vegetation. These conditions make the growing of perennial plants somewhat less attractive than it seems. On the other hand some perennials have definite advantages. Since they are already established when spring arrives, they produce garden flowers from early spring until late fall, in a variety of types and colors. Some perennials need be moved only at long intervals, if at all, and actually seem to improve when kept in one location for many years. Examples of such hardy perennials that are ideal for the central Great Plains include Campanula carpatica turbinata (Sch. Nym. & Kotschy) Nichols, Clematis hirsutissima Pursh, Clematis integrifolia L., daylily (Hemerocallis sp.), Euphorbia epithymoides L., gasplant (Dictamnus sp.), Geranium pratense L., Geranium sanguineum L., and peony (Paeonia sp.).

Cultural Notes

Herbaceous perennials may be planted and arranged in many different ways in a flower garden, backyard border, specially designed bed, or around the house. Sufficient space should be allowed for each plant in its mature form to grow well and to be cared for properly. Perennials should never be planted so close together that individual characteristics are lost, nor be spaced so far apart that the effect of a united planting is lost. Most perennials do not compete successfully with woody plants, particularly in dryland areas. Columbine (Aquilegia sp.) is an outstanding exception to this statement.

As a rule, short perennials should be planted where they will not be hidden by tall varieties. Spring flowering bulbs may be interplanted, in groups, in perennial plantings for early color and other effects. Care should be exercised to keep all perennial plants within the prescribed limits set for them at time of planting or else the perennial bed will soon become filled with the more aggressive and vigorous species.

Garden soils in the central Great Plains are generally of good texture and fertility, and are somewhat alkaline. Perennial plants require a good measure of soil fertility, which may be maintained with organic or chemical fertilizers. Either source is satisfactory if the necessary chemical elements are present in the fertilizer. The elements most apt to be lacking in the soil are nitrogen, phosphorus, and available iron. Organic matter added to Great Plains soils is decidedly beneficial to their texture since it increases water holding capacity, aeration, and the growth and activity of many beneficial soil organisms. Soil in the perennial planting should be kept well cultivated, aerated, and free from weeds. Watering is governed by need and is most effective when the soil is thoroughly soaked at about 1-week intervals rather than lightly sprinkled every day or two during the growing season.

Propagation

Perennial plants are propagated by seed, softwood cuttings, divisions of bulbs, tubers, corms, rhizomes, or roots. The seed of most perennials will grow quite readily if it is newly

harvested. Such seed may be fall-planted in pots and if it does not germinate soon, it may be placed in stratification over winter. It will not grow otherwise. Stratification is accomplished by planting the seed in pots--either in soil or sand--and placing it in cold storage for 3 to 4 months. The temperature during this time should be between 30° and 40° F. and the stratification media must be kept moist. Seed large enough to not get lost may be placed in moist sphagnum moss in polyethylene bags for stratification. Seed in stratification should be checked at regular intervals. When growth starts, the seedlings should be potted and placed in a coldframe or greenhouse.

Many perennial species propagate quite readily from softwood cuttings. These are prepared in the spring or summer from new vigorous growth. When the shoots have several new leaves the stem is cut, usually just below a node, where the growth is succulent. Quite often, such shoots can be snapped off just above the harder growth to give the best cuttings. These cuttings may be from 1 to 8 inches long, depending on the ultimate size and vigor of the parent plant. All leaves are left on the cuttings, which are dipped in a fungicide and in a rooting hormone powder, and set in perlite or clean sand under mist in the propagating area. Home gardeners may use trays or flats of the rooting media and construct an elevated cover of polyethylene to keep the humidity high and to let light enter. The leaves are left on the cuttings so the plant can manufacture necessary hormones that aid in the rooting process. When roots are well formed, the cuttings are potted in good garden soil. A critical period for some newly rooted cuttings is the time immediately after potting. At this time, special care--such as placing the plants under a mist spray or in the shade--should be taken to keep them moist and unwilted until the roots become established in the soil.

Propagation by bulbs, tubers, corms, rhizomes or roots requires knowledge of the hardness of the plants concerned. Hardy plants need only be dug and replanted when they increase and have too many plants growing above them. Tender plants must be dug each fall before the soil freezes and stored over the winter at above-freezing temperatures in humidity adequate to prevent shrivelling of the bulb or tuber. Care is taken in the division of these groups for spring planting to have at least one eye or growth point on each division. As an example, dahlias--which have no eyes on the tuber, but only in the base of the old stem near the point where the tubers are attached--are divided so as to leave one or more eyes for each tuber. Bulblets, cormels, and even scales from lily bulbs are used in this method of propagation.

Perennial plants that propagate from rhizomes or various types of thickened, woody, or hardy vigorous roots are dug as a complete unit with care to preserve the major portion of the root system. Soil may then be removed from the roots by any method that does not injure them. A stream of water under pressure may often be used to do this. When the roots of most perennials are cleaned for inspection, natural divisions that may be cut or pulled apart occur. Any section with roots and crown or top growth will, if promptly reset while the roots are moist, grow and make a satisfactory new plant. Care must be taken to keep roots always moist while such plants are being divided. They should be heeled into moist soil or set in buckets of water if left unattended for a time.

Diseases and Insects

Foliar diseases are quite scarce in the central Great Plains due largely to very low humidity during the growing season. In summers characterized by frequent rain showers, some mildew does occur on a few perennial species, but generally not until after flowering is finished. Insects are not particularly troublesome although infestations of some of the aphids and leafhoppers do occur in varying degrees. Since these insects often are carriers of virus diseases, it is well to keep them under control by spraying regularly with some of the new nontoxic general-purpose

insecticides that are available commercially. Certain of the new fungicides may be added to the insecticide if necessary and if they are compatible when used together.

Species Trials

The Cheyenne Horticultural Field Station was established in 1928 and the first experimental plantings were made in 1930. Because of the adaptability of herbaceous perennial plants to the central Great Plains region (fig. 1), trials of these plants were begun in 1930 and are continuing in 1964. These plants came from commercial outlets and experiment stations in many countries; collections from the wild in the United States, Canada, and other countries; botanic gardens; arboretums; and many private collections.

Species were obtained as seed or vegetative parts. Because of the age of the seed or because it might have deteriorated in storage before it was planted at the station, many of the different kinds that were collected failed to grow. However, plants of many species and cultivars were obtained. The hardiness of the most desirable species is reported in table 1.

The record of the performance of the trial species at Cheyenne is not complete. Many of the species that were established in the field during the 1930's were lost due to weed competition and manpower shortage during World War II, when staff members were moved elsewhere to engage in essential war work.

A. C. Hildreth, former station Superintendent, was responsible for collecting many of the perennial plants used in the trials. Table 1 is compiled from the complete perennial summaries that listed 193 genera in 712 species. Generally, only those plants with a hardiness rating of 4 or 5 and an "ornamental value" rating of "good" or "best" are shown. These include the perennials most desirable for planting in the central Great Plains on the basis of current information. In addition to the species performing as herbaceous perennials, 177 species comprising 107 genera performed as annuals and 206 species comprising 102 genera performed as biennials at the Cheyenne station. Many genera in these trials had some species that were found in each of the three classifications--annual, biennial, and perennial.

Table 1.--The herbaceous perennials most desirable for planting in the central Great Plains as determined in field trials at the Cheyenne Horticultural Field Station for 33 years, 1931-63, inclusive

Botanical name	Common name	Hardiness ¹	Ornamental value ²
<u>Achillea millefolium</u> L. 'Rubra'	Red common yarrow	5	Good
<u>Achillea ptarmica</u> L.	Sneezewort yarrow	5	Best
<u>Allium cyrillii</u> Ten.	---- Onion	5	Good
<u>Althaea armeniaca</u> Ten.	---- Althaea	5	Good
<u>Anchusa azurea</u> Mill.	Italian bugloss	4	Best
<u>Aquilegia chrysantha</u> Gray	Golden columbine	4	Good
<u>Aquilegia coerulea</u> James	Colorado columbine	4	Good
<u>Aquilegia longissima</u> Gray	Longspur columbine	4	Good
<u>Aquilegia vulgaris</u> L.	European columbine	4	Good
<u>Argemone intermedia</u> Sweet	---- Pricklepoppy	4	Good

See footnotes at end of table.

Botanical name	Common name	Hardiness ¹	Ornamental value ²
<u>Artemisia absinthium</u> L.	Common wormwood	5	Good
<u>Artemisia stelleriana</u> Bess.	Beach wormwood	5	Good
<u>Aster novibelgii</u> L.	New York aster	5	Good
<u>Campanula carpatica</u> Jacq.	Carpathian bellflower	4	Best
<u>Campanula carpatica turbinata</u> (Sch. Nym. & Kotschy.) Nichols	Top bellflower	5	Best
<u>Centaurea carnolica</u> Host	---- Centaurea	5	Good
<u>Centaurea dealbata</u> Willd.	Persian centaurea	5	Best
<u>Centaurea macrocephala</u> Puschk.	Globe centaurea	5	Best
<u>Chrysanthemum achilleaefolium</u> (Bieb.) DC.	Yarrow chrysanthemum	5	Good
<u>Chrysanthemum arcticum</u> L.	Arctic chrysanthemum	4	Good
<u>Clematis caripensis</u> H.B.K.	---- Clematis	5	Best
<u>Clematis hirsutissima</u> Pursh.	Douglas clematis	5	Best
<u>Clematis integrifolia</u> L. 'Coerulea'	---- Solitary clematis	5	Best
<u>Clematis x jackmanii</u> Moore	Jackman clematis	3	Best
<u>Coreopsis grandiflora</u> Hogg.	Bigflower coreopsis	4	Good
<u>Delphinium bulleyanum</u> Forr. ex Diels	Bulleys larkspur	5	Best
<u>Delphinium grandiflorum</u> L. cv. 'Chinense'	Slender Siberian larkspur	4	Good
<u>Dianthus x allwoodii</u> 'Alpinus' Hort.	Allwood x alpine pink	4	Good
<u>Dianthus arenarius</u> L.	Finland pink	4	Good
<u>Dianthus arvernensis</u> Rouy. & Fouc.	Auvergne pink	4	Good
<u>Dianthus chinensis laciniatus</u> Regel	Fringed Chinese pink	3	Best
<u>Dianthus pinifolius</u> Sibth. & Sm.	Pineleaf pink	5	Best
<u>Dianthus seguierii</u> Vill.	Ragged pink	5	Good
<u>Dianthus superbus</u> L.	Lilac pink	3	Good
<u>Dictamnus albus</u> L.	Gasplant dittany	5	Best
<u>Dictamnus albus ruber</u> Bailey	---- Gasplant dittany	5	Best
<u>Echinops ritro</u> L.	Small globethistle	5	Best
<u>Euphorbia cyparissias</u> L.	Cypress euphorbia	5	Best
<u>Euphorbia epithymoides</u> L.	Cushion euphorbia	5	Best
<u>Euphorbia myrsinites</u> L.	Myrtle euphorbia	4	Good
<u>Gaillardia aristata</u> Pursh.	Common perennial gaillardia	4	Best
<u>Geranium pratense</u> L.	Meadow geranium	5	Best
<u>Geranium sanguineum</u> L.	Bloodred geranium	5	Best
<u>Geranium tuberosum</u> L. 'Macro-stylum'	---- Geranium	5	Best
<u>Geum triflorum</u> Pursh.	---- Avens	4	Good
<u>Gypsophila acutifolia</u> Fisch.	Big gypsophila	4	Good
<u>Gypsophila paniculata</u> L. 'Compacta'	---- Babysbreath	3	Good
<u>Gypsophila trichotoma</u> Wend.	Clasping gypsophila	4	Good
<u>Hemerocallis x baronii</u> K. Spreng.	---- Daylily	5	Best
<u>Hemerocallis middendorffi</u> Trautv. & Mey.	Middendorff daylily	5	Good

See footnotes at end of table.

Botanical name	Common name	Hardiness ¹	Ornamental value ²
<u>Inula helenium</u> L.	Elecampane inula	5	Good
<u>Iris pumila</u> L.	Whiteedge iris	4	Good
<u>Iris germanica</u> L.	German iris	5	Good
<u>Iris graminea</u> L.	Grass iris	5	Good
<u>Iris kaempferi</u> Sieb.	Japanese iris	³ 2-5	Best
<u>Iris missouriensis</u> Nutt.	Rocky Mountain iris	5	Good
<u>Iris pallida</u> Lam. 'Dalmatica'	---- Sweet iris	5	Best
<u>Iris reichenbachii</u> Heuff.	Balkan iris	5	Good
<u>Kniphofia</u> sp.	---- Torchlily	4	Best
<u>Lathyrus latifolius</u> L.	Perennial peavine	4	Good
<u>Liatris punctata</u> Hook.	Dotted gayfeather	4	Good
<u>Liatris spicata</u> (L.) Willd.	Spike gayfeather	4	Good
<u>Lilium candidum</u> L.	Madonna lily	4	Best
<u>Lilium henryi</u> Baker	Henryi lily	4	Best
<u>Lilium superbum</u> L.	Turkscap lily	5	Best
<u>Lilium tigrinum</u> Ker.	Tiger lily	5	Best
<u>Lilium umbellatum</u> Pursh.	Western orange cup lily	4	Best
<u>Linum narbonense</u> L.	Narbonne flax	4	Good
<u>Linum perenne</u> L.	Perennial flax	4	Good
<u>Lychnis chalcidonica</u> L.	Maltesecross campion	3	Good
<u>Lycoris squamigera</u> Maxim.	Autumn lycoris	3	Good
<u>Lythrum salicaria</u> L.	Purple lythrum	4	Good
<u>Macleaya microcarpa</u> (Maxim.) Fedde	---- Plumepoppy	5	Good
<u>Malva moschata</u> L.	Musk mallow	4	Good
<u>Menispermum dauricum</u> DC.	Asiatic moonseed	5	Best
<u>Mirabilis multiflora</u> (Torr.) Gray	Colorado four-o'clock	4	Good
<u>Monarda mollis</u> L.	Mintleaf beebalm	4	Good
<u>Nepeta mussinii</u> Spreng.	Persian nepeta	5	Good
<u>Oenothera hookeri</u> T. & G.	Hooker evening primrose	3	Good
<u>Paeonia lactiflora</u> Pall.	Chinese peony	4	Best
<u>Paeonia officinalis</u> L.	Common peony	5	Best
<u>Papaver orientale</u> L.	Oriental poppy	5	Best
<u>Parthenocissus quinquefolia</u> (L.) Planch.	Virginia creeper	5	Best
<u>Pennisetum purpureum</u> Schumach.	Napiergrass	5	Good
<u>Penstemon barbatus</u> (Cav.) Roth	Beardlip penstemon	4	Good
<u>Penstemon cobaea</u> Nutt.	Cobaea penstemon	3	Best
<u>Penstemon glaber</u> Pursh.	Sawsepal penstemon	4	Good
<u>Penstemon grandiflorus</u> Nutt.	Shell-leaf penstemon	3	Good
<u>Penstemon hirsutus</u> (L.) Willd.	Type penstemon	3	Good
<u>Penstemon johnsonae</u> Vieh.	Flathead Lake penstemon	4	Good
<u>Penstemon unilateralis</u> Rydb.	Oneside penstemon	4	Best
<u>Phacelia glandulosa</u> Nutt.	Glandular Phacelia	4	Good
<u>Phlox x pyramidalis</u> Smith	Decussata phlox	4	Good
<u>Phlox paniculata</u> L.	Summer phlox	4	Best
<u>Polygonum Reynoutria</u> Makino	---- Knotweed	3	Good

See footnotes at end of table.

Botanical name	Common name	Hardiness ¹	Ornamental value ²
<u>Potentilla argentea</u> L.	Silver cinquefoil	4	Good
<u>Potentilla gracilis</u> Dougl. ex Hook.	Northwest cinquefoil	5	Best
<u>Potentilla nepalensis</u> Hook. 'Minor'	Small Nepal cinquefoil	4	Good
<u>Potentilla pinatifida</u> Presl.	----- Cinquefoil	5	Best
<u>Potentilla recta</u> L.	Sulfur cinquefoil	5	Best
<u>Ratibida columnaris</u> (Sims) D. Don	Upright prairieconeflower	4	Good
<u>Ratibida pinnata</u> (Vent.) Barnh.	----- Prairieconeflower	4	Good
<u>Rudbeckia laciniata</u> L.	Cutleaf coneflower	5	Good
<u>Salvia argentea</u> L.	Silver sage	4	Best
<u>Salvia dumetorum</u> Andr.	----- Sage	5	Good
<u>Salvia juriscii</u> Kosanin.	----- Sage	5	Good
<u>Saponaria ocymoides</u> L.	Rock soapwort	4	Good
<u>Sedum acre</u> L.	Goldmoss stonecrop	4	Good
<u>Sedum pruinosum</u> Britt.	----- Stonecrop	4	Good
<u>Sedum spectabile</u> Boreau.	Showy stonecrop	4	Good
<u>Sedum spurium</u> Bieb. var. 'Coccineum' Groenl. & Rpl.	----- Tworow stonecrop	4	Good
<u>Sedum telephium</u> L.	Liveforever stonecrop	5	Good
<u>Sempervivum tectorum</u> L.	Hen-and-chickens	5	Good
<u>Sphaeralcea remota</u> Fern.	----- Globemallow	4	Good
<u>Sphaeralcea rivularis</u> (Hook.) Torr. ex Gray	Stream globemallow	4	Best
<u>Tanacetum vulgare</u> L.	Common tansy	5	Good
<u>Thalictrum aquilegifolium</u> L.	Columbine meadowrue	5	Good
<u>Thermopsis caroliniana</u> M. A. Curt.	Carolina thermopsis	5	Best
<u>Thermopsis montana</u> Nutt. ex T. & G.	Mountain thermopsis	4	Good
<u>Trollius ledebouri</u> Reichb.	Ledebour globeflower	4	Good
<u>Veronica caucasica</u> M. Bieb.	----- speedwell	5	Good
<u>Veronica incana</u> L.	Woolly speedwell	5	Best
<u>Veronica latifolia</u> L.	Hungarian speedwell	4	Good
<u>Veronica pinnata</u> L.	----- Speedwell	4	Good
<u>Veronica spuria</u> L.	Bastard speedwell	5	Best
<u>Yucca glauca</u> Nutt.	Small soapweed	5	Good

¹ Hardiness: 1--killed 1st winter.

2--weak second year, some plants dead.

3--survived winter, lacks vigor.

4--survived winter well, moderate vigor.

5--strong, vigorous, healthy.

² Ornamental Value: best--a total plant effect that is desirable according to kind; this includes color, flower size, plantform, symmetry; nearing perfection.
good--an attractive plant that grows well but may be lacking flower color, flower size, or symmetry; not as pleasing.

³ Some seedlings of this species are much harder than others.

Discussion of Special Genera and Their Varieties

The following genera are discussed mostly by their varieties. Variety improvement through plant breeding has produced the adaptable varieties listed. These varieties often have resulted from the hybridization of two or more species. Table 1 reports on true species trials with but few exceptions.

Bulb Crops

A number of perennial flowers grow from bulbs or bulb-like underground parts. These are not included in table 1. Three genera - Tulipa, Narcissus, and Muscari - are very successfully grown in the central Great Plains region.

These types of Tulipa grow and flower to perfection: Botanical, Cottage, Darwin, Double-flowered, Emperor, Multi-flowered, and Parrot.

Many varieties of Narcissus (daffodils) are not long lived. The following have survived and produced well at Cheyenne for the past 28 years. The best varieties are starred: America, Augusta, Bernardino, Glory of Sassenheim, *Great Warley, *Holland's Glory, Lucinus, *Masterpiece, Olympia, Sir Watkins, Spring Glory, Sunrise, Victoria, Van Waverin's Giant, *Whistler.

The common grapehyacinth (Muscari) is early flowering, colorful, and persists indefinitely with a good increase in bulbs. Adaptable species tested were: M. armeniacum Leicht, M. coeruleum A. Los., and M. conicum Bak.

The following genera are grown from bulbs and are generally less showy, smaller-flowered, and except for Puschkinia (which is hardy and long-lived) persist only for 1 to 3 years in the perennial garden: Brodiaea, Chionodoxa, Convallaria (Lily-of-the-valley), Crocus, Erythronium, Freesia, Hyacinth, Oxalis, Puschkinia, and Scilla.

Other Perennial Groups

A special summary is devoted to the following genera:

Chrysanthemum

Much chrysanthemum breeding for specific regions has been done during the past 30 years. As a result, many new adaptable varieties for the Great Plains are available in the commercial nursery trade. Only those varieties tested and grown in one's own locality are recommended for growing.

Dianthus

Plants of the genus Dianthus include Carnation, Pinks, and Sweet William. These are some of the most colorful and fragrant of all flowers but generally are not winter hardy in the region. A limited amount of breeding for hardiness has been done and a few hardy or near-hardy varieties are available.

Hemerocallis

The daylilies are generally very winter-hardy and adaptable. Their only serious fault is that some varieties are highly susceptible to iron-deficiency chlorosis. Of a limited number of species and varieties tested at Cheyenne, the following kinds have shown considerable chlorosis resistance:

Species.--

Hemerocallis citrina

Hemerocallis middendorffi

Varieties.--

Amaryllis

Baroni

Dawn

Gladys Perry

Hyperion

Kwanso

Linda

Modesty

Morocco

Nigrette

Ochroleuca

Pale Moon

Queen of May

Rajah

Serenade

Stalwart

Sunny West

Viscountess Byng

Iris

Many species of the genus Iris are well adapted and sufficiently winter-hardy for growing in the central Great Plains region. Of the hybrid varieties commonly available in nursery lists, many have performed well in the region. The common strains of Japanese Iris (Iris kaempferi) are not winter-hardy; however, a few hardy varieties of this species are known.

Paeonia

The genus Paeonia comprises one of the large beautiful groups of hardy, early-flowering plants for the Great Plains. The peonies stay in their own location and improve with the years. Care must be taken in planting to place the crown just below the soil surface.

Perennial Asters

Several species of the perennial aster genus are native to the Great Plains. They generally have small, single flowers, weak stems, and are rhizomatous, thus spreading badly under cultivation. Limited trials of the new large, colorful, and often semi-double flowered varieties have shown the following varieties to be adaptable in the region: Antwerp Pearl, Festival, Janet McMullen, Lassie, Plenty, Picture, Red Sunset, Winston Churchill.

Phlox

The perennial phlox are sufficiently winter-hardy in the region but most varieties are highly susceptible to iron-deficiency chlorosis. Approximately 200 named varieties have been tested for hardiness and chlorosis resistance at the Cheyenne Station. Only the white variety Mrs. Jenkins (Independence) was found to be highly chlorosis resistant. The following named varieties are moderately chlorosis resistant: Albion, Border Queen, Colonial, Flora Reidy, General Petain, Le Mahdi, White Pyramid.

Literature Cited

- (1) Hansen, N. E.
1924. Flowers every day in the year. S. Dak. Agr. Expt. Sta. Bul. 208, 16 pp.
- (2) Herman, J. R.
1935. Hardy flowers, shrubs, trees and vines for Washington homes. Wash. State Col. Ext. Bul. 181 (revised), 8 pp., illus.
- (3) Oliver, R. W.
1946. Descriptive notes on herbaceous perennials for Canadian gardens. Canada Dept. Agr. Pub. 968, 37 pp.
- (4) _____
1956. Growing herbaceous perennials. Canada Dept. Agr. Pub. 970, 24 pp.
- (5) Preston, I.
1946. Herbaceous perennials for Canadian gardens. Canada Dept. Agr. Farmers' Bul. 138, 91 pp., illus.
- (6) United States Department of Agriculture.
1941. Climate and man. U.S. Dept. Agr. Yearbook 1941, 1248 pp., illus.